

Corresponding to the patient fixation apparatus is the apparatus used by the surgeon to view and assess the extent of fixation and the alignment of the laser beam. The surgeon views this display when looking down the surgical microscope. Current technology provides a display including a graticule or crosshair. A He-Ne  
5 beam is sometimes provided for aiming the surgical beam.

US Patent 4,870,964 provides a head-up display for use with an operating microscope during phaco-emulsification procedures. This apparatus allows the operating surgeon to view information about the status of the patient, the eye and operating equipment, such as vacuum pressure, without removing their gaze from  
10 the operating field. It does so by projecting light onto the operating field of the eye and conditioning the reflections from the cornea so that interpretable images may be viewed by the surgeon as they look down the microscope. US Patent 5,135,299 describes a similar operating microscope featuring a head-up display, produced by reflecting operational information from the scleral portion of the eye.

15 It is an object of the present invention, in at least one aspect, to provide an eye fixation method and apparatus that is simple and reliable, and involves minimal expectation of the patient. For particular applications, it is further preferred that the arrangement reduces the angular rotation of the ocular globe to facilitate alignment of an instrument with the axis of astigmatism.

20 It is an object of another aspect of the present invention to provide a surgical visual feedback method and apparatus that provides increased information to the surgeon or operator.

### Summary of the Invention

According, therefore, to a first aspect of the present invention, there is  
25 provided a method for limiting the rotation of the ocular globe of an eye to facilitate alignment of an instrument with the axis of astigmatism of the eye. The method includes providing fixation target means in the field of view of the eye so that the eye may fixate on the target. The fixation target means includes or consists of at least one elongate component.

Preferably the method includes providing the fixation target means by way of light emitting means. Preferably, the light emitting means is strobed.

The present invention also provides, in its first aspect, a fixation apparatus that limits rotation of the ocular globe of an eye, to facilitate alignment of an instrument with the axis of astigmatism of the eye. The apparatus includes fixation target means for locating in the field of view of the eye so that the eye may fixate on the target. The fixation target means includes or consists of at least one elongate component.

Preferably, said fixation target means includes or consists of at least two intersecting substantially mutually perpendicular elongate components. The fixation target means may consist substantially of a cross, and/or it may include more than two elongate components arranged as a grid. The fixation target means preferably has a fixed orientation.

The fixation target means may be a light emitting means. Moreover, the or each elongate component may be defined by the light emitting means.

Preferably, the light emitting means includes a plurality of light emitting diodes (LEDs) arranged in a respective linear array to define the or each elongate component.

Preferably the apparatus includes a printed circuit board (PCB) on which the LEDs are mounted.

Preferably the apparatus is controllable to strobe the light emitting means.

The apparatus may include a pulsable power supply to strobe the light emitting means.

In its first aspect, the invention extends to laser surgery apparatus incorporating patent observable fixation apparatus as described above.

In a second aspect of the present invention there is provided a method for

## Claims

1       A fixation apparatus for limiting the rotation of the ocular globe of an eye, to facilitate alignment of an instrument with the axis of astigmatism of the eye, including:

5                       fixation target means for locating in the field of view of said eye so that said eye may fixate on said target;

                      wherein said fixation target means includes or consists of at least one elongate component.

2       Apparatus according to claim 1 wherein said fixation target  
10 means includes or consists of at least two intersecting, substantially mutually perpendicular elongate components.

3       Apparatus according to claim 2 wherein said fixation target means consists substantially of a cross.

4       Apparatus according to claim 2 or 3 wherein one of the at least  
15 two elongate components is longer than the other.

5       Apparatus according to claim 1 wherein said fixation target means includes more than two elongate components arranged as a grid.

6       Apparatus according to any one of claims 1 to 5 wherein said fixation target means is a light emitting means.

20       7       Apparatus according to claim 6 wherein the or each said elongate component is defined by said light emitting means.

8       Apparatus according to claim 6 or 7, wherein said light emitting means includes a plurality of light emitting diodes arranged in a respective linear array to define the or each said elongate component.

9 Apparatus according to claim 8, further including a printed circuit board (PCB) on which the light emitting diodes are mounted.

10 Apparatus according to any one of claims 6 to 9, further including means to strobe said light emitting means.

5 11 Laser surgery apparatus incorporating patient observable fixation apparatus according to any one of claims 1 to 10.

12 Laser surgery apparatus according to claim 11, wherein said fixation target means is disposed in a patient observable position on a surgical microscope of said laser surgery apparatus.

10 13 Laser surgery apparatus according to claim 12 wherein said at least one elongate component is arranged in a "vertical" orientation on said surgical microscope.

14 A method for limiting the rotation of the ocular globe of an eye to facilitate alignment of an instrument with the axis of astigmatism of the eye, including  
15 providing fixation target means in a field of view of said eye so that said eye may fixate on said target, wherein said fixation target means includes or consists of one elongate component.

15 A method according to claim 14, wherein said fixation target means includes or consists of at least two intersecting, substantially mutually  
20 perpendicular elongate components.

16 A method according to claim 15, wherein said fixation target means consists substantially of a cross.

17 A method according to claim 14, wherein said fixation target means includes more than two components arranged as a grid.

25 18 A method according to anyone of claims 14 to 17, including providing said fixation target means by way of light emitting means.